QUEEN’S GENETICS TEAM WINS BRONZE AT MIT-BASED COMPETITION

The Queen’s Genetically Engineered Machine Team (QGEM) recently returned from an international competition with a bronze medal for their innovative work in synthetic biology – a rapidly developing field combining molecular biology and engineering principles to design and construct biological systems. The team’s focus this year was to use an engineered microorganism, E. coli, to treat atherosclerosis, a disease in which plaques build up in arteries causing heart attacks, among other complications. The goal was to re-engineer E. coli to target and deliver beneficial drugs at the site of an atherosclerotic plaque. The QGEM team competed in the International Genetically Engineered Machine Competition (iGEM) at MIT this Fall, which boasted over 1200 participants on over 110 teams from across the globe. Each team received a kit of standard biological parts and worked over the summer to design new parts, rearrange them or modify old ones to create new biological systems for use in microbial cells. Projects were organized under eight broad categories ranging from Environmental (e.g., heavy metal sequestration), to Food/Energy (e.g., ethanol production from whey), and all the way to software projects that model genetic circuitry.

The QGEM team consisted of undergrads from the Bioengineering option of Chemical Engineering (Parthiv Amin, Mike Freeman, and Kate Turner), Engineering Chemistry (Chris Palmer, James MacLeod, Bodgam Momciu, Harry Zhou). The faculty advisors for the team consisted of Ron Neufeld (Chemical Engineering) and faculty from Biochemistry, Microbiology and Immunology, Pathology and Molecular Medicine, and Biology. Additional background on the QGEM team can be found at http://2009.igem.org/Team:Queens.
Ontario Research Funds Awarded to Two Chemical Engineering Professors

Two Chemical Engineering professors recently received Ontario Research Fund (ORF) grants, as part of Ontario’s Innovation Agenda. Lauren Flynn was awarded $100,000 to investigate alternative treatment options for traumatic injury and disease, while Kim Woodhouse received $125,000 to support her work developing artificial blood vessels. Queen’s research was boosted $25 million by Ontario Government infrastructure grants. The ORF is supporting forty-six projects involving 342 scientists and researchers at thirteen institutions across the province.

Canada Research Chair Renewed for Stephen Waldman

Stephen Waldman, who is jointly appointed between Chemical Engineering and Mechanical Engineering departments, holds a Canada Research Chair in Engineering of Human Joints. After a thorough review process, we are pleased that Stephen’s Canada Research Chair was renewed for a further five years. In addition, Stephen was awarded tenure this year, and was promoted to Associate Professor. Stephen’s research is in the biomedical engineering field, specifically in the areas of tissue engineering, mechanical stimulation of cells, development of bioreactors for tissue engineering, and the influence of nutrient delivery and supply on tissue formation.

Kim McAuley Appointed Associate Dean, School of Graduate Studies, Wins Graduate Supervision Award

Kim McAuley will be joining the School of Graduate Studies as an Associate Dean from July 1, 2010 to June 30, 2011. Kim joins the School of Graduate Studies with an outstanding reputation as recipient of many honours and awards. This Fall, she received the Award for Excellence in Graduate Supervision from the School of Graduate Studies, and last year she received the Excellence in Mentorship Award from MITACS (Mathematics of Information and Complex Systems). MITACS is a national centre that is part of the federal Network Centres of Excellence program.

Alumnus On the Hunt for Trace Metals

Colin Davidson came to Queen’s in 1994 as an undergraduate, and chose chemical engineering. He realized his ability to go long hours without sleep would serve him well as a member of the Queen’s Solar Car team. After graduating in 1998, Colin took a position at Daimler Chrysler in Bramalea, where he worked as a Supervisor in the Paint Department on the 300M, Intrepid and Concord. After two years, a desire to further his technical and engineering knowledge sent Colin back to school.

As a graduate student at Queen’s, Colin ran experiments lasting 200 hours or more, and requiring his attention for sampling and adjustments every 2 to 4 hours. He boasts of requiring little sleep, which continues to serve him well. After completing his Master’s degree, Colin worked at Apotex Pharmaceuticals for three years and proudly increased the production output of Simvastatin (a cholesterol drug) by 400%. He started at Recapture Metals in Peterborough in 2007.

Recapture Metals is a growing operation and Colin’s current positions as Plant Manager and Process Engineer vastly tap into his chemical engineering education. Colin works with specialists in the in-house R&D group to scale up chemical reaction prototypes and to develop the processing equipment needed for efficient throughput. Over the past three years Colin has built the organizational and technical capabilities of the Operations Group, and as a result production has more than quadrupled. Recapture Metals, which has facilities in Peterborough and Napanee, is not a familiar household name. However, this growing company plays an important role in our high-tech society, recycling specialty metals used in compound semi-conductors found in consumer electronics, such as cell phones and flat panel displays, and trace metals from super-alloys used in aircraft engines. We are proud to have been a part of Colin’s success.

Recapture Metals – A Team Project

Students in the Technology Engineering and Management (TEAM) project course were fortunate to visit Recapture Metals in October 2009 and met with the Plant Manager, alumnus Colin Davidson. The Peterborough plant operates several solvent extraction circuits to recover trace metals. Their TEAM project is to develop mathematical models for the predicting recovery circuit operation to support decision-making by the Operations Group.

Recapture Metals is an example of an inorganic chemistry production environment. “This is as real as chemical engineering gets” as Colin Davidson puts it. They do their own R&D and their processes are all unique. This is the first time Recapture Metals has worked with TEAM and they hope that having a strong affiliation with a university will help them tap into the pool of future graduates as potential employees.

To find out more about Recapture Metals, you can check their website at www.recapturemetals.com.
Undergraduate Curriculum Review

By Ted Grandmaison & Ron Neufeld

Enrolments in both Chemical Engineering (CHEE) and Engineering Chemistry (ENCH) continue to be high with 336 students in CHEE and 100 students in ENCH for years 2 – 4 of our programs. The Biochemical Option has been very popular for our CHEE students with about 55% of them selecting this option.

All departments in Applied Science are participating in a review of core curriculum requirements in preparation for the next Canadian Engineering Accreditation Board (CEAB) review in 2011. The objective is to identify and establish common features that should be present in courses dealing with engineering design, engineering economics and technical communications. The Chemical Engineering and Engineering Chemistry programs are well positioned to meet more stringent CEAB definitions of engineering design. The capstone 4th year design course, CHEE 470 (Design of Manufacturing Processes), presented by Dave Mody, forms the primary design exposure for our students. More formative topics are also to be presented in earlier years of all programs in Applied Science. We have introduced a new course in design and scaleup of unit operations for our 3rd year students and design projects constitute part of our second year core courses.

Graduate Program Review Underway

The Chemical Engineering Graduate Program was reviewed in the past year by the Ontario Council of Graduate Studies (OCGS) and received accreditation for the next seven years as a program of “good quality” (the highest category of accreditation). As part of a review of all of our undergraduate and graduate programs of study, we are examining the structure and course offerings of our Master’s and PhD programs. The graduate program will be the focus of a strategic planning session in January, and continuing discussions by the Graduate Studies Advisory Committee (GSAC). With strong support from graduate students and faculty, the GSAC will examine course offerings and requirements to ensure that we keep up with the ever-changing needs for chemical engineers in various areas of research interest and practice.

The GSAC will also be revamping and publishing a new Graduate Student Manual to help guide new graduate students through the minefield of graduate studies, and to ensure that they are aware of their responsibilities and rights as students of Queen’s. If you have any thoughts that you would like to share with us about our graduate program (e.g., as a graduate degree holder from our department), please write to martin.guay@chee.queensu.ca. This 2009/10 GSAC Committee is composed of Martin Guay (Graduate Studies Coordinator), Brant Pepple, Juliana Ramsay, PhD Candidate Jeff Wood, Milia Candidate Mark Hoidas and Devon Leheer, with Barbara Lawson providing administrative support as Graduate Assistant. Thanks everyone.

CHEM ENG CLUB – A NOTE FROM THE OUTGOING PRESIDENT (JASON MUNN)

The ChemEng Club has been hard at work providing the students of Chemical Engineering an outlet from the daily grind. After bonding at the Boiler Room rock climbing facility, the ’08/’09 executive was ready to climb to greater heights. Social events included a welcome back BBQ, the BNO/GNGO (boys night out/girls night out), which brought out record numbers, the Science Formal wine and cheese and the Christmas Potluck, which delivered great food as well as some unusually interesting gifts for the professors. The annual ChemEng ski trip to Mont Tremblant sold out and the ski conditions were absolutely perfect.

However, the club is more than just fun and games. The speaker series gave students a chance to talk to Career Services and recent graduates about the job application process. More recently, the Oil and Gas speaker series – an event hosted by Dave Mody and assisted by the club - was a huge success with a turnout of around 130 students. The club maintains the cluster library (thanks for your book donations) and is responsible for some of the more fashionable folks with their sales of ChemEng Club merchandise.

The club is an important way for chemical engineering students to get involved in what has become a large department. Hard work from each member of the club has led to the success of these events, which is by no means an easy task with such a large class size. The club would like to thank all faculty, staff, and students for making the year one to remember.

Jason Munn (’08/’09 President)

Research & Graduate Studies News

We Wang, a Ph.D. candidate under the supervision of Robin Hutchinson, published an invited feature article “Recent Advances in the Study of High-Temperature Free Radical Acrylic Solution Co-polymerization” in the Macromolecular Reaction Engineering Journal in 2008. Part of a research project funded by DuPont, the article elucidates the development of kinetic models to describe the high-temperature solution polymerization process used to make acrylic resins for automotive coatings. Their article was listed for the first ten months of 2009 on the journal’s website as the most accessed article over a twelve month period, and was selected by Wiley-VCH publishing as one of nine papers (out of a field of 1200) to be featured in a special edition “Best of Macromolecular Journals 2008.” This article is one of eight articles written by Wei Wang as first author. Please go to news.chemweb.com/2009/12/07/1/.

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Graduate Students Excel

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In their inaugural year of operation, CEGSA has worked to provide a mechanism through which graduate students can communicate with the faculty and staff, as well as each other, and take an active role in the continuing evolution of the department. CEGSA is involved in many current departmental issues, ranging from evaluating graduate course curriculum, to organizing social events, to identifying and contacting diverse and distinguished speakers for the Departmental Seminar Series so that researchers in the department can gain insights from leading research in Chemical Engineering.

Another priority of CEGSA is to help foster a sense of community. CEGSA has organized several social events throughout the year for students, staff, and faculty in the department. Many successful barbecues, sporting days, and talent nights have been enjoyed by all, with proceeds raised being donated to charities. However, CEGSA has no plans of stopping there. We are always looking to become involved in new and meaningful endeavors that can improve the experience of Chemical Engineering graduate students at Queen’s University.

CEGSA has already proven effective in providing graduate student representation and input to several departmental and external committees. Now, we hope to continue our growth and to become a lasting tradition within the department, on campus, and within our local community.

If you would like to learn more about CEGSA, or provide input, please email cegsa@chee.queensu.ca anytime. We are always happy to hear from you! You can also check out our website at chemeng.queensu.ca/graduate/CEGSA/.

Alison Turner President of CEGSA

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THE LIFE AND CAREER OF DR. ROGER BUTLER (1927-2005)

By Jim McLellan, Head of Chemical Engineering

On my advancement and alumni visits, I have been asked a number of times by alumni from the early 1960s about Dr. Roger Butler. Born in England, he came to Canada during WW II as a teenager and graduated from Samia Collegiate in 1944, with honours scholarships in mathematics and physics. Dr. Butler completed his B.Sc. in Chemical Engineering at Imperial College in 1948 with 1st class honours and the highest standing in his class. He completed his Ph.D. and D.I.C. at Imperial College in 1951, and came to Queen’s University, where he joined the Head of the Chemical Department, Dr. Campbell Plewes, and taught a variety of courses in the Chemical Engineering program. Dr. Butler taught at Queen’s until 1955, when he left and joined Imperial Oil. Dr. Butler worked in a variety of positions at Imperial and at Exxon in Samia, New York and Calgary. Amongst other responsibilities, he was in charge of computer control at the Imperial Oil Samia Refinery in the 1960s, at a time when computer control was just starting to be introduced in the refining industry. Dr. Butler retired from Imperial Oil in 1982 and became the Director of Technical Programs at the Alberta Oil Sands Technology and Research Authority (AOSTRA), which played an instrumental role in the development of oil sands extraction techniques. He then joined the University of Calgary in 1984 as an endowed chair in Petroleum Engineering, finally retiring in 1995. After his retirement, Dr. Butler founded GravDrain Inc., a research and consulting company for the heavy oil industry. He is recognized as the father of SAGD (steam assisted gravity drainage) and Vapex, extraction processes that revolutionized in-situ recovery of bitumen from oil sands. He once said that he first thought of the SAGD idea when he was considering techniques for mineral extraction for a Saskatchewan potash mine more than 40 years ago. Before his death in May, 2005, he saw his SAGD concept commercialized, opening the second, in-situ, phase of Athabasca oil sands production. Encana Corporation, Canadian Natural Resources Limited, Petro-Canada are among those now producing with SAGD technology. Due to the research and perseverance of people like Dr. Roger Moore Butler, billions of barrels of otherwise valueless oil sands have become widely acknowledged to be economically recoverable. His career bookmaks the success of chemical engineering in its true form of design, improvement and maintenance to ensure processes operate safely, sustainably and economically. Portions of this note were adapted from Dr. Butler’s obituary, with kind permission from his family.

NEW COLLABORATIVE PROGRAM IN BIOMEDICAL ENGINEERING

A new collaborative program in Biomedical Engineering has taken on students for the 2009/10 academic year. The program, which links graduate studies in Chemical, Electrical and Mechanical Engineering, brings students from a variety of backgrounds together to learn about research methodology and professional practice in Biomedical Engineering. The program is overseen jointly by Brian Amsden (Chemical Eng), Stephen Waldman (Chemical Eng, Mechanical Eng) and Evelyn Morin (Electrical Eng). Research aspects of this program include biomechanics and prosthetics, biomaterials, tissue engineering and regenerative medicine, and medical imaging.

Additional information on this program can be found at:

engineering.queensu.ca/programs/bme

For other TEAM success stories from this program, please visit http://team.appsci.queensu.ca

“CONTROLLING MAJOR ACCIDENT HAZARDS IN CANADA” – A TEAM Success Story

This year represents the twenty-fifth anniversary of the Bhopal, India tragedy, where a release of methyl isocyanate gas led to the deaths of thousands, and serious health effects that linger to this day. It is fitting therefore that one of the TEAM projects completed this year addressed the issue of industrial safety in the chemical manufacturing field. Under the direction of David Mody, a TEAM group from the Faculties of Applied Sciences and Law, along with the School of Business, worked together with the Canadian Chemical Producers’ Association and with active support from the Canadian Society for Chemical Engineering, to investigate strategies and policies for avoiding industrial accidents. The report, entitled “Controlling Major Accident Hazards in Canada” was issued by the Canadian Society for Chemical Engineering, 2009, ISBN No. 0-920804-98-0, and was prepared by two Chemical Engineering undergraduates, an undergraduate from the School of Business, and two Law students. The report provides a road map for closing the disparity between how countries around the world have worked to prevent industrial incidents, as compared with Canada. The report can be found on the CSChem website at www.cheminst.ca/224/3/Index1.shtml.

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OPPORTUNITY OF A LIFETIME

“Performing research in another country is the opportunity of a lifetime. You should go if you get the chance,” says Mary Thomson, a doctorate candidate in Chemical Engineering, who spent three months at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland learning computational methods.

A strong research group in their field at the Federal Institute of Technology decided to switch their direction of research, leaving behind the computational methods that they had developed. Instead of allowing this method to fall by the wayside, they gave Mary the opportunity to go to Zurich to pick up this research method and to apply it to the chemistry that is done in Canada. Her goal is to teach her colleagues in Canada how to use the computational method. Her time in Switzerland was crucial, allowing her to diversify her research. Mary now works on both modeling and experimental research.

Images courtesy of Assistant Professor Lauren Flynn.
In The News

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ASC Grown on Tissue-Culture Poly styrene

Undifferentiated ASC

ASC Differentiating into Fat Cells

Stained with Oil Red O

ASC Close-up of Differen tiating ASC

Images courtesy of Assistant Professor Lauren Flyer.

Opportunity Of A Lifetime

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Chemical Engineering Faculty Member is the (Web) Host with the Most

The website for the International Polymer Colloids Group (IPCG) will soon be hosted by Chemical Engineering Faculty member, Michael Cunningham. The IPCG group is comprised of about 70 researchers, which developed from an idea in the early 1960’s that a networking group for researchers in this field was needed. The exchange of ideas soon involved members of the international community and the group is still growing. With full support from the Department of Chemical Engineering, Michael will be producing newsletters for this group as well as managing the growing membership.

Canadian Society for Chemical Engineering

Paraphrased from a report by Edith Deretey for APSC291

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The Chemical Engineering Graduate Student Association (CEGSA) was formed in late 2008 to unify the Chemical Engineering graduate student community at Queen’s, and to provide a social network amongst the various graduate research groups in the department. What began as a humble few has grown to an Executive consisting of twelve dedicated Chemical Engineering graduate students who generously and enthusiastically volunteer their time for the benefit of their fellow graduate students and the department.

In their inaugural year of operation, CEGSA has worked to provide a mechanism through which graduate students can communicate with the faculty and staff, as well as each other, and take an active role in the continuing evolution of the department. CEGSA is involved in many current departmental issues, ranging from evaluating graduate course curriculum, to organizing social events, to identifying and contacting diverse and distinguished speakers for the Departmental Seminar Series so that researchers in the department can gain insights from leading research in Chemical Engineering.

Another priority of CEGSA is to help foster a sense of community. CEGSA has organized several social events throughout the year for students, staff, and faculty in the department. Many successful barbecues, sporting days, and talent nights have been enjoyed by all, with proceeds raised being donated to charities. However, CEGSA has no plans of stopping there. We are always looking to become involved in new and meaningful endeavors that can improve the experience of Chemical Engineering graduate students at Queen’s University.

CEGSA has already proven effective in providing graduate student representation and input to several departmental and external committees. Now, we hope to continue our growth and to become a lasting tradition within the department, on campus, and within our local community.

If you would like to learn more about CEGSA, or provide input, please email cegsa@chee.queensu.ca anytime. We are always happy to hear from you! You can also check out our website at chemeng.queensu.ca/graduate/CEGSA.
ONTARIO RESEARCH
Funds Awarded to Two
Chemical Engineering
Professors

Two Chemical Engineering professors recently received Ontario Research Fund (ORF) grants, as part of Ontario’s Innovation agenda. Lauren Flynn was awarded $100,000 to investigate alternative treatment options for traumatic injury and disease, while Kim Woodhouse received $125,000 to support her work developing artificial blood vessels. Queen’s research was boosted $25 million by Ontario Government infrastructure grants. The ORF is supporting forty-six projects involving 342 scientists and researchers at thirteen institutions across the province.

Kim McAuley Appointed Associate Dean,
School of Graduate Studies, Wins Graduate
Supervision Award

Kim McAuley will be joining the School of Graduate Studies as an Associate Dean from July 1, 2010 to June 30, 2011. Kim joins the School of Graduate Studies, Wins Graduate Supervision Award from MITACS (Mathematics of Information and Complex Systems). MITACS is a national centre that is part of the federal Network Centres of Excellence in Mentorship Award from MITACS (Mathematics of Information and Complex Systems). Last year she received the Award for Excellence in Graduate Supervision Award.

Canada Research Chair Renewed for Stephen Waldman

Stephen Waldman, who is jointly appointed between Chemical Engineering and Mechanical Engineering departments, holds a Canada Research Chair in Engineering of Human Joints. After a thorough review process, we are pleased that Stephen’s Canada Research Chair was renewed for a further five years. In addition, Stephen was awarded tenure this year, and was promoted to Associate Professor. Stephen’s research is in the biomedical engineering field, specifically in the areas of tissue engineering, mechanical stimulation of cells, development of bioreactors for tissue engineering, and the influence of nutrient delivery and supply on tissue formation.

Recapture Metals – A Team Project

Recapture Metals is a growing operation and Colin’s current positions as Plant Manager and Process Engineer vastly tap into his chemical engineering education. Colin works with specialists in the in-house R&D group to scale up chemical reaction prototypes and to develop the processing equipment needed for efficient throughput. Over the past three years Colin has built the organizational and technical capabilities of the Operations Group, and as a result production has more than quadrupled. Recapture Metals, which has facilities in Peterborough and Napanee, is not a familiar household name. However, this growing company plays an important role in our high-tech society, recycling specialty metals used in compound semi-conductors found in consumer electronics, such as cell phones and flat panel displays, and trace metals from super-alloys used in aircraft engines. We are proud to have been a part of Colin’s success.

Alumni Profile – Colin Davidson BSc ’98 MSCE ’03

Alumnus On the Hunt For Trace Metals

Colin Davidson came to Queen’s in 1994 as an undergraduate, and chose chemical engineering. He realized his ability to go long hours without sleep would serve him well as a member of the Queen’s Solar Car team. After graduating in 1998, Colin took a position at Daimler Chrysler in Bramalea, where he worked as a Supervisor in the Paint Department on the 300M, Intrepid and Concord. After two years, a desire to further his technical and engineering knowledge sent Colin back to school.

As a graduate student at Queen’s, Colin ran experiments lasting 200 hours or more, and requiring his attention for sampling and adjustments every 2 to 4 hours. He boasts of requiring little sleep, which continues to serve him well. After completing his Master’s degree, Colin worked at Apotex Pharmaceuticals for three years and proudly increased the production output of Simvastatin (a cholesterol drug) by 400%. He started at Recapture Metals in Peterborough in 2007.

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Queen’s Genetics Team Wins Bronze at MIT-based Competition

The Queen’s Genetically Engineered Machine Team (QGEM) recently returned from an international competition with a bronze medal for their innovative work in synthetic biology – a rapidly developing field combining molecular biology and engineering principles to design and construct biological systems. The team’s focus this year was to use an engineered microorganism, E. coli, to treat atherosclerosis, a disease in which plaques build up in arteries causing heart attacks, among other complications. The goal was to re-engineer E. coli to target and deliver beneficial drugs at the site of an atherosclerotic plaque. The QGEM team competed in the International Genetically Engineered Machine Competition (iGEM) at MIT this Fall, which boasted over 1200 participants on over 110 teams from across the globe. Each team received a kit of standard biological parts and worked over the summer to design new parts, rearrange them or modify old ones to create new biological systems for use in microbial cells. Projects were organized under eight broad categories ranging from Environmental (e.g., heavy metal sequestration), to Food/Energy (e.g., ethanol production from whey), and all the way to software projects that model genetic circuitry.

The QGEM team consisted of undergrads from the Bioengineering option of Chemical Engineering (Parthiv Amin, Mike Freeman, and Kate Turner) and Engineering Chemistry (Chris Palmer), a graduate student from Chemical Engineering (Jonas Gerson), and students from Biology, Life Sciences, and Biochemistry. The faculty advisors for the team consisted of Ron Neufeld (Chemical Engineering) and faculty from Biochemistry, Microbiology and Immunology, Pathology and Molecular Medicine, and Biology. Additional background on the QGEM team can be found at http://2009.igem.org/Team:Queens.